Delivering medicine directly into a tumor

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Researchers at Burnham Institute for Medical Research at University of California, Santa Barbara have identified a peptide (a chain of amino acids) that specifically recognizes and penetrates cancerous tumors but not normal tissues. The peptide was also shown to deliver diagnostic particles and medicines into the tumor. This new peptide, called iRGD, could dramatically enhance both cancer detection and treatment. The work is being published December 8 in the journal *Cancer Cell*.

Led by Erkki Ruoslahti, M.D., Ph.D., distinguished Burnham professor at UCSB, this research was built on Dr. Ruoslahti's previous discovery of "vascular zip codes," which showed that blood vessels in different tissues (including diseased tissues) have different signatures. These signatures can be detected and used to dock drugs onto vessels inside the diseased tissue. In addition to homing in on tumor vessels, the new iRGD peptide penetrates them to bind inside the tumor. Previous peptides have been shown to recognize and bind to tumors, but were unable to go beyond the tumor blood vessels.

"This peptide has extraordinary tumor-penetrating properties, and I hope that it will make possible substantial improvements in cancer treatment," says Dr. Ruoslahti. "In our animal studies, the iRGD peptide has increased the efficacy of a number of anti-cancer drugs without increasing their side effects. If these animal experiments translate into human cancers, we would be able to treat cancer more effectively than before, while greatly reducing the side effects the patient would suffer."

The novel iRGD peptide, identified by using phage display for a peptide

that binds to the blood vessels of pancreatic and bone tumors, was tested to determine its ability to penetrate tumors. Researchers injected fluorescent-labeled iRGD into tumor-bearing mice and found that the peptide accumulated in a variety of tumors, including prostate, breast, pancreatic, brain and other types. In addition, the peptide only targeted the tumors and did not accumulate in normal tissue.

Iron oxide nanoworms, which can be visualized by magnetic resonance imaging, were coupled to the peptide and shown to penetrate the tumors, whereas uncoupled nanoworms could not. This demonstrates that iRGD can deliver diagnostics to tumors. The anti-cancer drug Abraxane was also shown to target, penetrate and spread more within tumor tissue when coupled to iRGD than with other formulations.

Source: Burnham Institute (news : web)